

60V NPN MEDIUM POWER LOW SATURATION TRANSISTOR IN SOT223
Description

This bipolar junction transistor (BJT) is designed to meet the stringent requirements of automotive applications.

Features

- $BV_{CE0} > 60V$
- $I_C = 6A$ High Continuous Collector Current
- $I_{CM} = 20A$ Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)} < 60mV @ 1A$
- $R_{SAT} = 35m\Omega$ for a Low Equivalent On-Resistance
- h_{FE} Specified up to 10A for High Gain Hold-Up
- Complementary PNP Type: ZX5T951GQ
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **The ZX5T851GQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

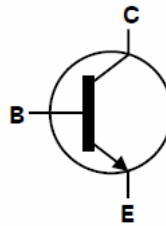
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 ^(e3)
- Weight: 0.112 grams (Approximate)

Applications

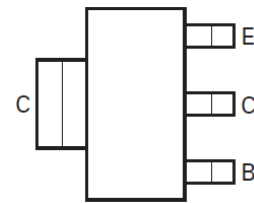
- Emergency Lighting Circuits
- MOSFET & IGBT Gate Drivers
- Solenoid, Relay and Actuator Drivers
- DC Modules
- Motor Control



Top View



Device Symbol

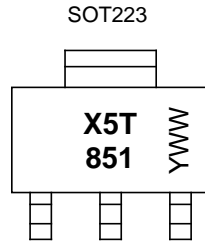

 Top View
Pin-Out

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZX5T851GQTC	Automotive	X5T851	13	12	4000

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



X5T 851 = Product Type Marking Code
 YWW = Date Code Marking
 Y or \bar{Y} = Last Digit of Year (ex: 0= 2020)
 WW or $\bar{W}W$ = Week Code (01-53)

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	6	A
Peak Pulse Current	I_{CM}	20	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

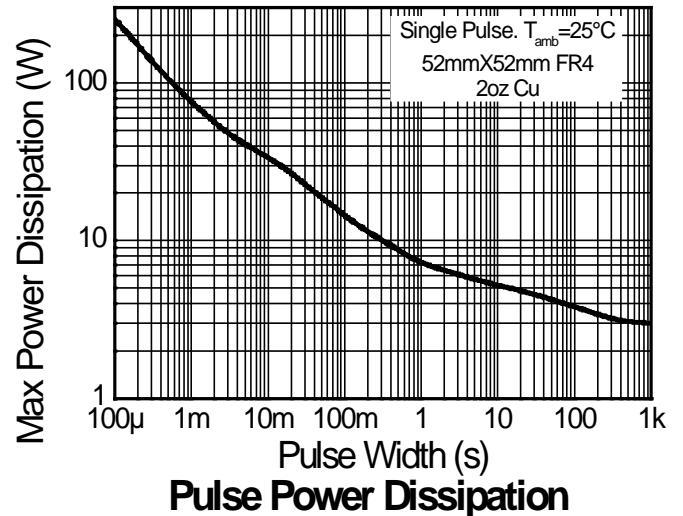
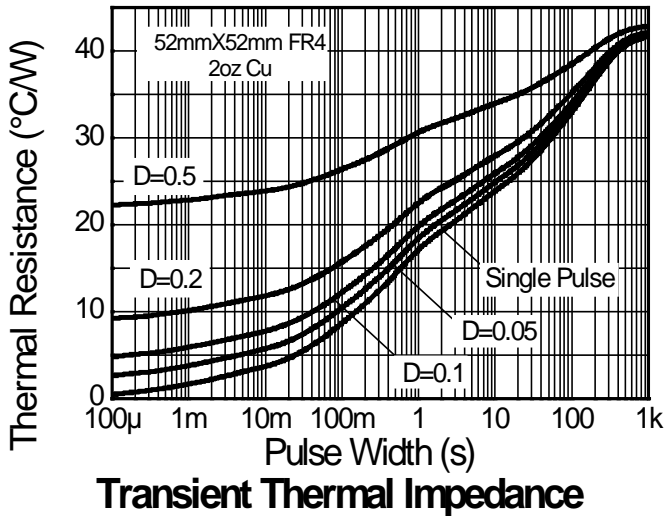
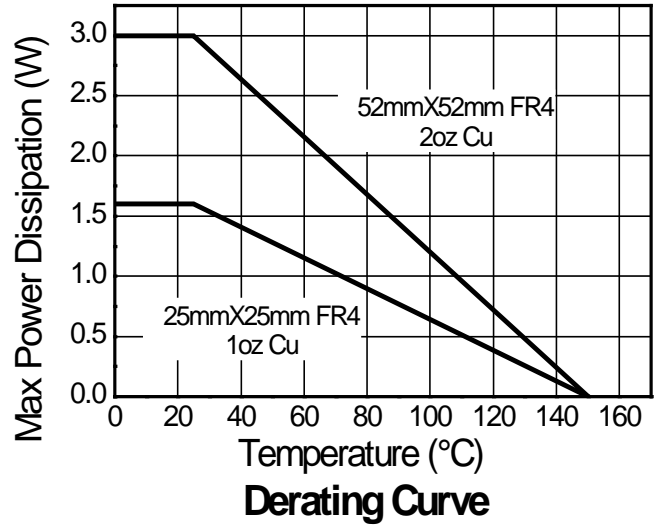
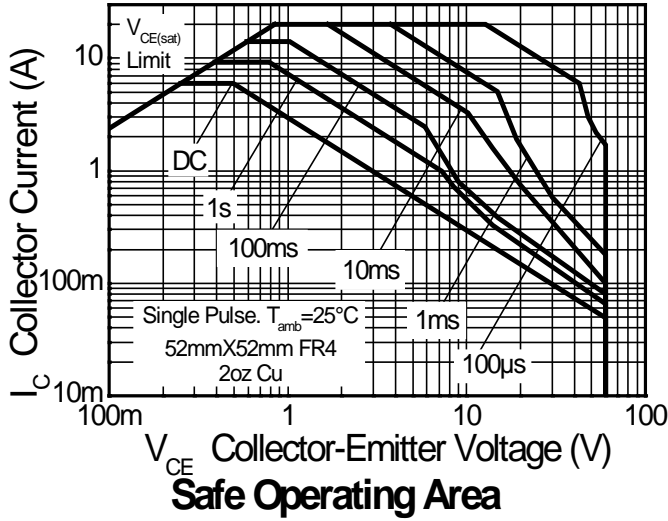
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	(Note 5)	3.0
		(Note 6)	2.0
		(Note 7)	1.6
		(Note 8)	1.2
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Note 5)	41.7
		(Note 6)	62.5
		(Note 7)	78.1
		(Note 8)	104
Thermal Resistance Junction to Lead	$R_{\theta JL}$	10.5	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

ESD Ratings (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5 except the device is mounted on 25mm x 25mm 2oz copper.
 7. Same as Note 5 except the device is mounted on 25mm x 25mm 1oz copper.
 8. Same as Note 5 except the device is mounted on minimum recommended pad layout.
 9. Thermal resistance from junction to solder-point (at the end of the collector lead).
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

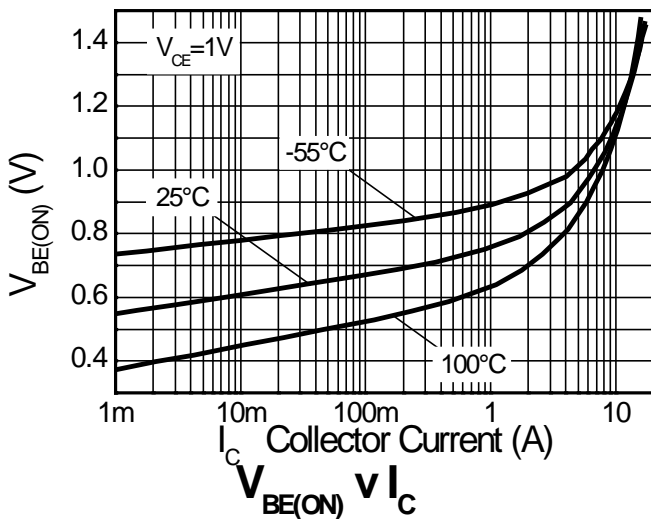
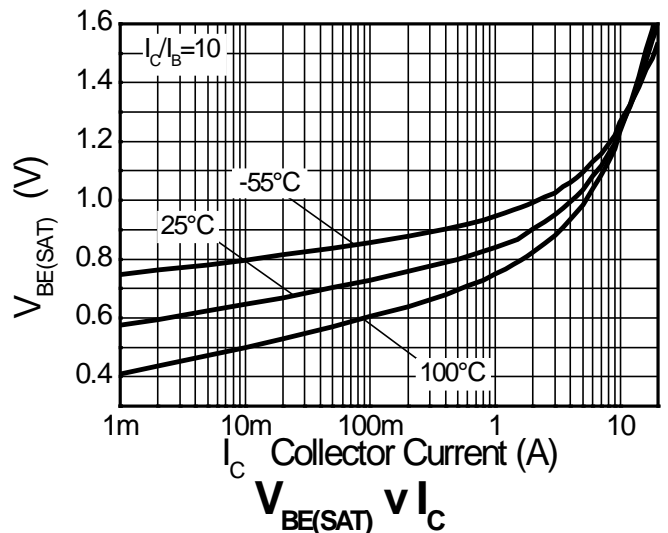
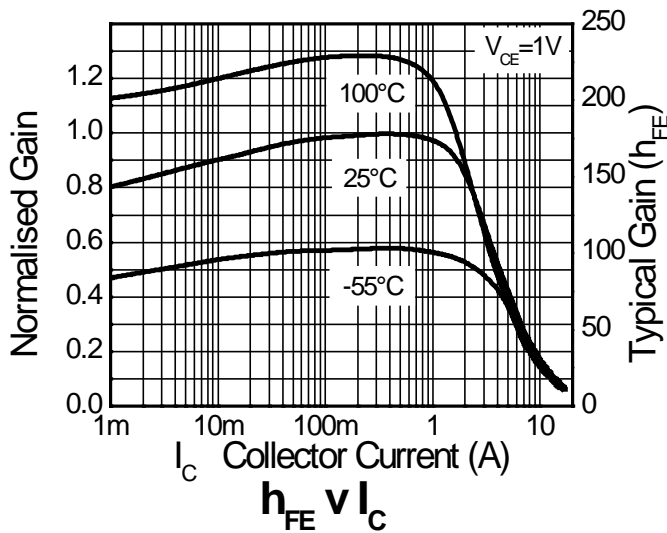
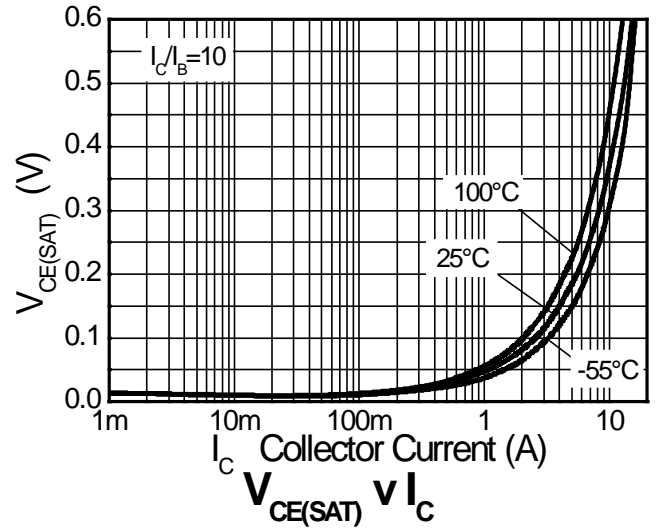
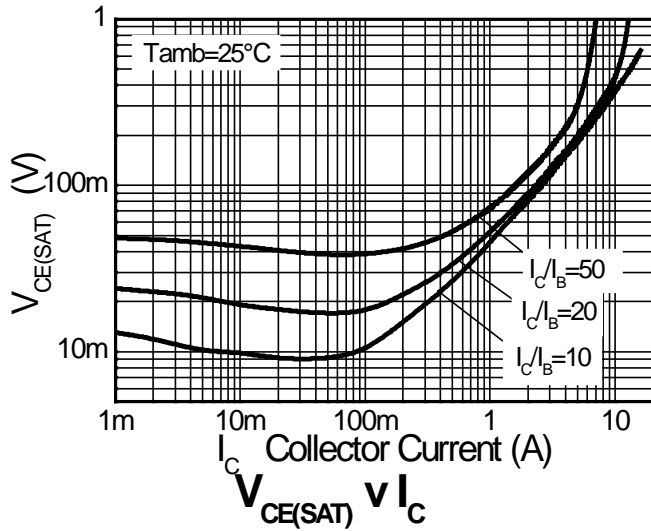


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	150	190	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	BV_{CER}	150	190	—	V	$I_C = 1\mu\text{A}$, $R_B \leq 1\text{k}\Omega$
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	60	80	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}	—	<1	20	nA	$V_{CB} = 120\text{V}$
		—	—	0.5	μA	$V_{CB} = 120\text{V}$, $T_A = +100^\circ\text{C}$
Collector Cut-Off Current	I_{CER}	—	<1	20	nA	$V_{CB} = 120\text{V}$
	$R_B \leq 1\text{k}\Omega$	—	—	0.5	μA	$V_{CB} = 120\text{V}$, $T_A = +100^\circ\text{C}$
Emitter Cut-Off Current	I_{EBO}	—	<1	10	nA	$V_{EB} = 6\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	—	20	30	mV	$I_C = 100\text{mA}$, $I_B = 5\text{mA}$
		—	45	60		$I_C = 1\text{A}$, $I_B = 100\text{mA}$
		—	50	70		$I_C = 1\text{A}$, $I_B = 50\text{mA}$
		—	100	135		$I_C = 2\text{A}$, $I_B = 50\text{mA}$
		—	210	260		$I_C = 6\text{A}$, $I_B = 300\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	1000	1100	mV	$I_C = 6\text{A}$, $I_B = 300\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	940	1050	mV	$I_C = 6\text{A}$, $V_{CE} = 1\text{V}$
DC Current Gain (Note 11)	h_{FE}	100	200	—	—	$I_C = 10\text{mA}$, $V_{CE} = 1\text{V}$
		100	200	300		$I_C = 2\text{A}$, $V_{CE} = 1\text{V}$
		55	105	—		$I_C = 5\text{A}$, $V_{CE} = 1\text{V}$
		20	40	—		$I_C = 10\text{A}$, $V_{CE} = 1\text{V}$
Output Capacitance	C_{obo}	—	31	—	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	130	—	MHz	$V_{CE} = 5\text{V}$, $I_C = 100\text{mA}$, $f = 100\text{MHz}$
Switching Times	t_{on}	—	42	—	ns	$I_C = 1\text{A}$, $V_{CC} = 10\text{V}$, $I_{B1} = -I_{B2} = 100\text{mA}$
	t_{off}	—	760	—		

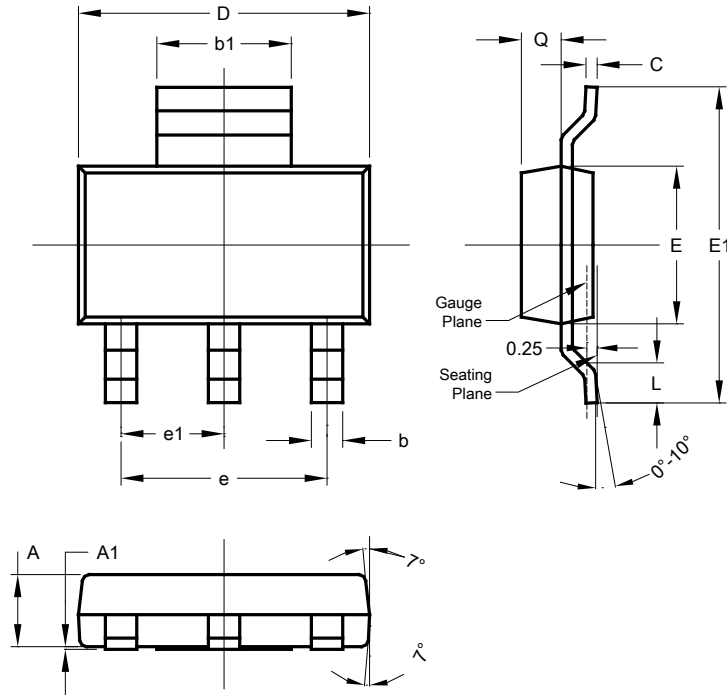
Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

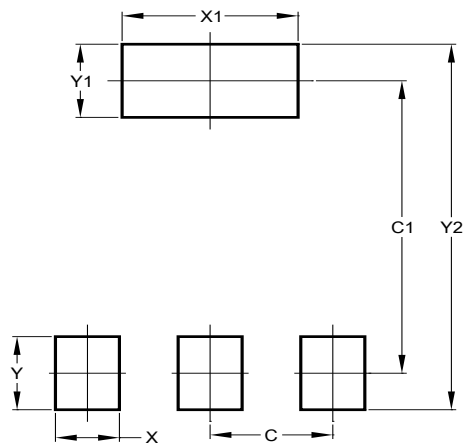
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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